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Reprint from the MEDICAL RECORD  
November 25, 1905

WILLIAM WOOD AND COMPANY  
NEW YORK





# SOME FACTS CONCERNING THE EARLY DIAGNOSIS OF PULMONARY TUBERCULOSIS.\*

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As a result of observation and experience gained while acting as the first medical superintendent of the New York State Hospital for the Treatment of Incipient Pulmonary Tuberculosis, the conviction that pulmonary tuberculosis is rarely recognized at an early and proper time for successful treatment has been decidedly strengthened. The organic law under which this novel institution was created provided that only incipient cases of tuberculosis could be admitted. It became necessary to devise and introduce methods by which patients suffering from that disease in the incipient stage could be secured. Applications for admission were sent to the superintendent of the institution, and arrangements were perfected by which the applicants could be examined by physicians designated as State examiners, who were appointed in each city of New York State. The blanks upon which the examiner made his report required a comprehensive study of the individual case, and included a diagram of the chest, which was filled in by the examiner, and showed the extent, location, and charac-

\*Read before the Academy of Medicine, Buffalo, N. Y., September 18, 1905.

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ter of the lesion. Full instructions containing a description of what would be accepted as an incipient case were sent to the examiners and also to physicians in dispensaries, hospitals, and elsewhere for their guidance.

In the year beginning July 1, 1904, and ending July 1, 1905, the records of the institution show that 965 applications for admission were received. Of these 205 were accepted as incipient or favorable cases. An examination of the records revealed the fact that of these 205 patients at the time of admission, only 101 could be properly designated as incipient or early cases. The average proportion of incipient cases under treatment in the hospital was sixty per cent., and only about one-tenth of the applications supposed to be suffering from incipient disease are included in that class. The inference seems fair that only about one-tenth of all the cases which were regarded by physicians as incipient and proper for admission could be rightfully included in that group.

During the seven years of agitation, when determined advocates were urging the necessity for one State hospital devoted to this class of sufferers, it was claimed that such an institution would not alone provide ideal prevention and rational, scientific relief, but that its chief function might be educational. Strenuous objections to its creation by the State were caused by the cry that the demand for admission from a vast number of patients in the early stage of the disease would be so great that the State could never bear the expense. The assurance that it would be difficult to fill the institution with patients if the law was obeyed was regarded as the delusion of an enthusiast.

Thus far no incipient case of tuberculosis has been denied admission to the institution, and the build-

ings have never contained more than one-third of the cases which could be accommodated. It may be true at the present time that patients may be denied admission because of the stupid parsimony and false economy on the part of the State officials in refusing to maintain more than one hundred patients in violation of the law, which states that accommodation should be supplied for two hundred; but the fact which I wish to emphasize is that it seems impossible to obtain enough patients in the early and curable stage of tuberculosis to fill one hospital which maintains one hundred patients and could accommodate one hundred and seventy-five. A moment's reflection will reveal the importance of this statement.

If an estimate be made by any method within our present knowledge it will be found that there are about 50,000 inhabitants of New York State suffering from pulmonary tuberculosis. During the year 1904 over 14,000 deaths were reported as due to that cause. By collecting the number of institutions for the treatment of tuberculosis in the State, and the percentage of early cases received for treatment, it will be found that only about one per cent. of all those afflicted with tuberculosis entered an institution at the proper time to obtain the highest percentage of recoveries. Furthermore, after years of effort on the part of those interested in procuring promising cases for treatment, it is found that only about twenty-five to thirty per cent. of the really favorable cases have thus far been obtained. Naturally this extraordinary condition leads to the inquiry "Why is the disease not recognized during the early stages?" and "Why are not more patients given the opportunity of receiving treatment which is the most promising at a proper time?"

In attempting to answer briefly these questions

time will be saved by dismissing at once from consideration that type of doctor who dislikes to be disturbed by the introduction of progressive methods, and complains of an imaginary tendency to treat disease before it is present. There can be no question that a part of the medical profession honestly believe that a definition of incipency may be too severe; that a diagnosis is demanded too early, or that refinements in diagnosis are required which only expert skill can supply. The transcendent importance of prompt relief at the earliest possible moment and its influence upon the result should be a sufficient reply.

Until quite recently no definition of an early, favorable, or incipient case has been accepted. During the spring of 1905 a committee was appointed by the president of the "National Association for the Study and Prevention of Tuberculosis" to prepare and present a report containing a classification with definitions for the consideration of that body at the inaugural meeting. The following definition of incipency or favorability was agreed upon, presented to the association, and adopted for one year's trial:

"Slight initial lesion in the form of infiltration limited to the apex or small part of one lobe.

"No tuberculous complications. Slight or no constitutional symptoms (particularly including gastric or intestinal disturbances or rapid loss of weight).

"Slight or no elevation of temperature or acceleration of pulse at any time during twenty-four hours, especially after rest.

"Expectoration usually small in amount or absent.

"Tubercle bacilli may be present or absent."

If this definition serves no other purpose it will prove exceedingly valuable by supplying a standard for the statistical reports of results. The attempt to prepare a brief definition will naturally be followed by criticism, and it must be assumed that distinctions,

whether based upon the extent of pathological changes or the history of symptoms, cannot be made arbitrarily. Thus, tuberculosis of both apices may be slightly manifest and the conditions truly favorable; but it must be remembered that, as a rule with few exceptions, disease in one apex follows disease in the other apex after an interval of months. Again, it is often difficult, and sometimes impossible, to recognize the presence of infiltration until pathological changes in the way of new formation sufficient to fill the air spaces and produce some consolidation have developed. Evidently the meaning is plain that this can and should be recognized during the period of invasion before any destructive process has begun.

Turban's scheme and classification which has been adopted in Europe, does not contain any description of incipency, nor is the favorable type described. As modified by the committee of the National Association, it will furnish an excellent scheme for the recording of the results of all classes of cases. The most serious objection which is disclosed after careful study is the fact that it is based almost exclusively upon the extent of anatomical lesions.

It is probable that an examination of the records of many institutions will show that after the test supplied by this definition is applied a smaller number of early cases have been treated than have been previously reported. Inquiries submitted to a number of sanatoria in the United States to learn the percentage of incipient cases received, as defined above, reveal the fact that the average percentage of all patients under treatment which could be designated as early and favorable varies from two to thirty. An analysis of all cases treated at the New York State Hospital shows that sixty per cent. were received. To the best of my knowledge, it is the highest percentage published. The results justify the careful selection



of applicants, and will be considered at another time. The reasons which may account for the failure to secure early recognition of a tuberculous lesion in the chest may be considered in the following order

The patient does not seek medical advice. This is certainly a potent factor among the poor. On the other hand, the poor patient often visits a physician who does not make a careful examination, or a dispensary where the attending physician may not be qualified to make a diagnosis until the disease is advanced.

A dispensary should be established in every city where men qualified to detect the early signs of tuberculosis are in attendance. Opportunities to become acquainted with the signs and symptoms of beginning tuberculosis at a dispensary make it probably the best school for a young physician who is seeking instruction in that field of work.

It must not be forgotten that little or nothing could be gained by the early detection of tuberculosis among the poor until the last few years. The discovery of its presence was equivalent to a death sentence, and there was slight inducement to recognize it promptly. The time is rapidly approaching when the conditions surrounding the afflicted poor will be radically changed. The hope of recovery will encourage or compel closer attention and more experience and skill.

During the last decade efforts have been concentrated upon education and prevention, and the result, as evinced by the diminished death rate from tuberculosis, has been exaggerated; and the results of special methods of prevention aimed at that disease have long been misrepresented to a large degree. It has repeatedly been claimed that the death rate from tuberculosis was steadily diminishing in this State, in spite of the increase in population, but in the year

1904 the death rate was increased by more than one thousand, and the surprising rise in the mortality is yet unexplained. The writer has several times called attention to the constant relation between the mortality from tuberculosis and the general death rate.

This has led to a feeling that when the physician applies preventive measures he has practically done his full duty, and that it was regarded as sufficient to perceive the evidence of tuberculosis as portrayed by the picture drawn by the teacher and provided by the text book. Viewed in relation to the appearance of incipient evidence of disease, one is reminded of the days when a fatal case of inflammation of the bowels was regarded as evidence of appendicitis.

This brings me to another reason which I regard as second in importance, and it is realized that any plain speaking concerning it has long been regarded as quite dangerous. I refer to the faulty education in the medical schools, the inadequate and misleading teaching of text books and the lack of proficiency and thoroughness displayed by the medical profession concerning the early detection of tuberculosis of the lungs. This may be largely due to the recent distinctive prominence given to laboratory methods and the tendency to discard the methods of the clinician. The unwarranted dependence upon the presence of the bacillus in the expectoration, and the greatly exaggerated idea of its importance as the only reliable single sign have done immeasurable harm. While the fact that slight changes are overlooked among the poor may be understood, it is only too plain that the well-to-do often receive no more skillful attention. An acquaintance with a large class of patients sent to health resorts reveals the same failure to perceive early manifestations of the disease or to advise treatment at the

proper time. This mistake simply adds hardship to affliction.

The student or young practitioner is often afforded no opportunity to examine or study a developing case of pulmonary tuberculosis. His first patient of that description offers him a new experience. The patients seen in the clinic, or the descriptions read in the textbook betray the classical features of advanced disease. The symptoms and signs accompanying early and advanced lesions are jumbled together and made very confusing. Sufficient time is not given to the examination of the healthy chest, to gain a familiar acquaintance with normal sounds. The older clinicians and the men proficient in the methods of physical diagnosis appreciated more fully the importance of comparing the sounds of health and disease.

The ear is not sufficiently trained and the hearing is not acute, and an attempt is made to make the unmusical ear detect slight changes and alterations of pitch. This can never be done without hard work and large experience. Some men can never recognize gradations of pitch because the ear is not capable of appreciating them. The art of palpation and percussion is not valued at its true worth, and the chest is not thoroughly searched.

There seems to be a widespread misunderstanding concerning the premonitory symptoms. Those considered are usually indicative of advanced disease. The fact is not emphasized that disease is present and can be detected for weeks and months before the chest is examined. From the inception of infection three to five months may elapse before the symptoms are complained of by the patient or sufficiently marked to attract attention. The prevalence of tuberculosis is forgotten and other causes looked for. Those most commonly assigned are bronchitis, a pro-

longed cold, or influenza. The symptoms are sometimes attributed to malaria in regions where it is practically unknown, or an apical pneumonia of small area is found; and it is not remembered that, in almost every instance, even when associated with grippe or influenza, it is tuberculous in origin. The character of the attack; the atypical nature of its course, and the distinct localization are only too plain. As illustrating the progress of symptoms and the time of their appearance, two cases under recent observation may be cited.

Both patients were sisters of consumptives, and were led to request examination by the belief that they had been exposed to infection. In both instances the physician in attendance had given no instruction in the way of prevention. The physical signs were evident at the apex. There were no symptoms whatever, both were apparently in good health. Three weeks after the first examination slight elevation of temperature occurred, and evidence of consolidation had extended somewhat. Under treatment the temperature has now subsided and the weight has increased. Thus far there has not been any cough or expectoration. These cases can be found repeatedly in persons where infection is suspected.

Mr. C. was admitted to the State Hospital. He had lost some weight and was somewhat anemic. The signs of infiltration were apparent at the apex. There was no cough and no fever. After a stay of three months the disease had apparently been arrested, when he caught a cold. Immediately fever with cough and expectoration appeared and bacilli were present in the sputa. The disease became active, later subsided, and was finally arrested.

The classical symptoms almost invariably presented in combination are loss of appetite, chlorosis

or anemia, loss of weight, cough, with or without expectoration, hemorrhage, and fever. It is extremely rare that all of these are associated at an early time. They are apt to be present at a later stage. This is particularly true of patients who have had rest, nourishing diet, and open-air treatment. Many times under these conditions few or no symptoms are apparent, and yet the disease may be progressive. The widely accepted statement that increase of weight and diminished temperature show arrest has many exceptions. It is only too common to find every general symptom of arrest with progressive physical signs, even to cavity formation. With a recent slight lesion about the only symptom observable is slight rise of temperature at some time in the twenty-four hours. Persistent fever, even with rest, is the most reliable and constant guide. It is frequently overlooked because the morning or early afternoon temperature may be normal, or the temperature is not taken on several days successively.

At the State Hospital a prolonged study was made of the significance and the vagaries of fever when associated with pulmonary tuberculosis. It was found that the large percentage of patients have the highest range of temperature between 5 and 8 o'clock. Many times the temperature was one degree higher at 7 o'clock than at 5 o'clock. This rule cannot be followed invariably, and if a case is to be closely observed, the temperature must be taken every two hours. The temperature may show a decided rise at noon. Thus a patient was admitted with a history of normal temperature morning and evening. This proved to be true in the hospital, but it was observed that he lost weight, and that he complained of feeling tired at noon. His temperature was taken every two hours while he was at rest in bed in the open air, and it was found to be 102°

daily between 12 and 1 o'clock. The influence of external temperature must be considered, as cold weather certainly controls and has an influence upon the febrile curve. This was particularly marked during one week in June.

The atmosphere was hot and humid. The temperature of all patients was taken several times a day and comparison made with a week in February which was cold and dry. A larger number of patients showed the presence of fever, and the average elevation of temperature was decisively higher than in the cold week. The rectal temperature is always more desirable and accurate. It is particularly true after the patient has been exposed to cold air for a length of time sufficient to produce an effect. The thermometers which are supposed to register in one or two minutes are usually thoroughly unreliable under this condition. After the thermometer is inserted for four minutes it will very often register a subnormal temperature, and after long exposure to the cold ten minutes may be required before the actual temperature can be known. This fact will also be observed when patients visit the office, and their temperature is taken after they have been for some time in the cold air. It will make a difference which should be considered whether the temperature has been taken after exercise or rest, or after a full meal in a warm room.

In children the temperature range is apt to be higher and other symptoms more marked, because the amount of disease is greater in proportion to the size and body weight. Again, in children the glandular involvement is apt to be much greater, and there may be multiple lesions instead of one.

It is not uncommon, particularly during cold weather, to find the temperature subnormal through the day and fever appear only in the evening. In

tuberculous cases two of the most frequent causes of temporary elevation of temperature beyond the usual daily record are menstruation and disturbances of digestion. With few exceptions, the temperature shows an upward curve during the first and second days of the menstrual epoch. Fever due to syphilis, intestinal toxemia, or neurasthenia is apt to be one of the most puzzling features to consider and exclude.

Loss of weight may be gradual or rapid and great or slight. The standard of weight for the individual should not be fixed at the highest ever attained. Age, previous illness, habits, and environment should receive attention, and the statement of patients concerning their normal weight are often unreliable. In view of the chances for error, it seems safe to compare the present with the average weight while in health. In truly incipient and favorable cases, the loss of weight may be very slight or nil. Decided loss of weight is apt to be associated with acute, extensive or prolonged disease. Continual high temperature, often unobserved, with indigestion and loss of appetite, may have been present for weeks or months before an alleged early diagnosis is made. There is usually a difference of two or more pounds between the morning and evening weight. The loss of appetite and indigestion are more important, as bearing upon the prognosis. They are not noticeable to any great extent, as a rule, during early manifestations. Chlorosis and anemia are much overestimated as early symptoms, and are frequently due to other causes. The blood counts and the estimation of hemoglobin failed to show the decided variation from an average healthy standard which has been claimed. The fact that chlorosis and neurasthenia have a decided influence upon the prognosis is another matter.

Practically all textbooks lay stress upon cough as



an early and most constant symptom. I have several times called attention to the fact that cough is apt to be due to pharyngeal irritation, and subsides after local treatment. Many times the so-called hacking cough owes its origin to nervous habit and disappears by an effort of will, or as a result of suggestion. It is not nearly so common among men as it is among women. As an early sign of tuberculosis its importance and the frequency of its presence have been much exaggerated, but it has and probably will continue to perform valuable service by directing attention to the chest.

Of the truly early cases treated at the State hospital very few coughed except infrequently. Physicians visiting the institution were forcibly struck by the absence of coughing. A dry cough, accompanied by some pain or irritation in the chest is of value and apt to be associated with localized pleurisy. When bronchial congestion with increased secretion is present the cough is more distinctive. It is not usually of a hacking character, however. The fact should be emphasized that tuberculosis is often present and can be detected before the patient gives any history or manifestations of a cough.

Hemorrhage during any stage of pulmonary tuberculosis rarely occurs in the Eastern or Middle States. A study of several hundred cases of tuberculosis in its incipency, both in hospital and private practice, has led to the conclusion that less than five per cent. display this symptom. Its importance when other causes are excluded cannot be too strongly emphasized. In fact it is an almost positive sign. Furthermore, the history of a hemorrhage antedating by months or years more recent symptoms is always interesting and should invite a search for a previous lesion which became quiescent, arrested, or healed.

Finally, the three important symptoms which may



be reliable guides are hemorrhage, fever, and loss of weight when they cannot be otherwise explained. My experience with the tuberculin test has been so slight that the expression of any views would be of questionable value. Certainly there are conditions in which a well-defined reaction may be misleading. The character of the product should be known, and the technique and what constitutes a reaction thoroughly understood. It is somewhat difficult to understand why this test is necessary except in a very small number of very puzzling cases. The desire to be ultra scientific may account for its exhibition at times. The experienced physician, trained in physical diagnosis, will find little need for its employment.

When suspicion is so strong that its use seems obligatory it may not be dismissed by a negative result. There is no positive proof that a person free from any tuberculous infection may not possibly react to a large dose of tuberculin. The tendency to depend upon positive evidence leads to a great source of evil. I refer to the stupidity of postponing the diagnosis until the bacillus may be found. In the vast proportion of cases its presence should be regarded as a late manifestation. There are times when its appearance may be one of the first indications of the disease, but experience will show that remarkably few patients call upon a physician until physical signs are manifest. The result of prompt and scientific treatment cannot be known if the habit of waiting until the evidence of tissue destruction are apparent.

Practically all cases of pulmonary tuberculosis detected during life eliminate bacilli at some period of their clinical history. None afflicted at the New York State Hospital failed to produce bacilli at some time during their stay. The disease seems to advance to

that stage, even when under treatment, but the extent of the disease and its ravages can be checked. The vast importance attached to the bacillus in its diagnostic rôle has become an excuse for carelessness, various deficiencies, and sometimes a commercial instinct.

The correspondence received from physicians showed that many physicians cannot satisfy themselves that a lung is affected by tuberculosis until the bacillus is discovered. It has been shown that even under broad and liberal construction of the meaning of the law, only about one-fifth of all applicants could be considered for admission. Several times physicians were so surprised by a refusal that the patient was sent to the institution anyway to prove that his opinion was correct. Nothing can be gained by reciting tales of frequent blunders. They are common in any line of special investigation. It may be of interest, however, to mention a few mistakes so apparent that the question of personal equation does not account for a marked difference of opinion. When patients were received, the result of the examination was compared with the findings as reported by the examiners. Errors were perceived concerning the extent, character, and location of the disease. Primary foci of disease previously existent escaped detection, and the fact that the recent lesion was secondary was overlooked. Only one focus was found where two or more existed: the lesion was sometimes located at the wrong apex or ascribed to the healthy lung. Pleurisy with effusion and even empyema were not recorded. The conditions relating to prognosis were not observed, and too much importance attached to the lesion alone. Histories were inaccurate, sometimes due to the dishonesty of patients who had been treated elsewhere, after which the disease became quiescent, and the present attack

was simply due to an exacerbation and new invasion or extension. Multiple patches and the disseminated or diffused forms were almost habitually not recorded.

The inclination to regard incipency simply in reference to time and duration was quite general. It should be obvious that a morbid process may be recent and yet active, progressive, extensive, or very grave. Associated tuberculous diseases were evidently not discovered or reported. The following complicating lesions were recognized at the hospital: anal fistula, infected cervical glands, infiltration or ulceration of the laryngeal apparatus, also tuberculosis of the epididymis and testicle. A difference in the findings was so noticeable and occurred with such frequency that attention was naturally directed to the possible sources of error. In some instances questioning of the patient elicited the statement that the chest had not been stripped. It was claimed that physicians had not insisted upon the removal of the shirt or underwear. A disinclination to bare the chests of women seems to prevail, and thoroughness is quite impossible if this is not done. There is no reason why a woman cannot expose the chest in private and place a soft towel about the lower part of the thorax enveloping part of the breasts.

The chest may be hastily examined in two or three minutes, but a careful search cannot be made in that time. In perplexing cases the mind must be concentrated and the faculty of hearing at its best. There are occasions when one will find it necessary to listen intently for minutes and go over a part of the chest repeatedly to obtain accurate information. The commonest location of beginning disease is at the apex or in some part of the upper lobes. It may be at the middle lobe near a bronchus, but the invasion below the clavicle is usually secondary or accom-

panied by or following pneumonia of mixed infection or pleurisy.

The tip of the lung rises during inspiration to a height of one and one-half inches above the clavicle, and sometimes a full inch into the neck. This part of the lung is often not investigated, nor is its mobility during inspiration and expiration observed. In attempting to ascertain the presence of delicate shades of sound obedience to the cardinal rule, "Compare, always compare," becomes a prime requisite. Inspection is certainly of little value except to exhibit the fact that the patient has never learned how to breathe. Some women have never taken a full breath.

The conformation of the chest may lead to suspicion, but experience has shown that any type of thorax may be invaded by the bacillus. Palpation may be so perfected that the sense of feeling becomes remarkably acute, but there are anatomical reasons why the stage of invasion cannot possibly be detected by the most proficient. It is sometimes employed and relied upon when the hearing is dull, uneducated, or the ear is not musical. Any teacher of physical diagnosis has learned that percussion is not an easy art, and that technique can only be acquired by practice. Reference to that point might seem trite were it not for the fact that improper percussion accounts for a large share of mistakes and deficiencies. The finger is not properly applied to the chest-wall; the resonance elicited is bony and the sound of a large area is enforced instead of that of a small limited locality. The light tapping, pushing blow from the wrist is not employed, and the normal differences, especially that between the right and left apex, are not diligently studied. Relative dullness, when slight, can be recognized only by distinguishing between gradations

of pitch. The quality and duration of the tones may not be sufficiently or distinctly audible. By humming and attempting to imitate the pitch of sound, the difference may be made apparent when otherwise the listener will fail to appreciate any alteration. At times sounds cannot be heard one day and can be readily distinguished the next. This may be explained by temporary dullness of hearing or lack of alertness, and it certainly happens with experienced examiners. There may be men present who can recall the authentic story that Austin Flint, for years during his residence in Buffalo, played the violin daily to preserve the fine sense of pitch with which he was endowed.

The region over the tip of the lung should be percussed during inspiration and the line of highest elevation marked, if necessary, by a pencil. Infiltration and consolidation not only produce relative dullness, but the tip of the lung is apt to be somewhat immovable or retracted. This is particularly noticeable in quiescent or healed lesions, and recent disease in one apex may be co-existent with the evidence of previous trouble at the other. Quite frequently the active lesion is secondary and another can be found elsewhere. The tendency to teach that invasion of the right apex is difficult or impossible of recognition by an examination of expiratory sounds is not only dangerous, but may be quite untrue. When the shape of the chest above the clavicle in front will not permit of satisfactory explanation, the attention may be confined to the posterior angle along the neck and over the scapula. With few exceptions, the sounds are more easily perceived, and the mouth of the patient should, as a rule, be open. At one place in this State where preliminary examinations were made prior to application for admission, I discovered

that a noisy room made proper or reliable work impossible.

The selection of stethoscopes and the fitting of the ear pieces are not always considered carefully. The openings of the earpieces in the newer stethoscopes are smaller than those used in the past, and they are much more liable to be filled with wax and dust, which escapes notice. Wax may accumulate in the ear and plug part of the opening of the ear-tips when they are applied. The practitioner who returns to work after a long vacation finds that the hearing must be tuned up again. This point is touched upon to illustrate the importance of practice and the necessity for opportunity to educate the ear constantly.

It seems highly probable that an unknown percentage of the students and physicians have never heard the natural vesicular murmur. They have always listened to the transmitted nasal or buccal sound produced by the friction of the air current. This factor is mentioned because the changes in the respiratory murmur can be detected at times only when this transmitted sound is introduced. The diagnosis of infiltration by auscultatory signs offers scope for discussion. The Germans rely very largely upon what is called "harsh," "roughened" breathing. We are acquainted with the following four types of breathing, which may be considered: First, vesicular; second, vesiculobronchial; third, broncho-vesicular; fourth bronchial. The distinction between the second and third is arbitrary, and the element of personal equation exists as an indeterminate factor. It must be admitted that any change in the nature of harshness or roughness must be manifested by a change in quality, duration, and pitch or it could not be differentiated. Furthermore, the alteration must be more evident at the time of expiratory effort.

I fail to see how anything but confusion and obscurity could follow the introduction and use of this term. Certainly the word bronchovesicular is preferable, and it is sufficient and explicit. It is enough to recognize the fact that the expiratory sound is prolonged, changed in quality, and higher pitched; and that the transition is due to the increased transmission of the tubular or bronchial breathing through a medium undergoing a difficult pathological change.

The essential difficulty is found in being able to perceive distinctions when the change is slight, and then comparison is the chief aid. Although any change is much more difficult to discern and is more unreliable at the right apex, the effort should not be discouraged and certain puzzling conditions exaggerated. A few of the older textbooks contain a reference to the normal relative increase of the bronchial element at the right apex, and state that the evidence of tuberculosis as revealed by change in the expiratory sounds may not be accepted as a reliable guide unless râles appear. In the last edition of Cabot's Physical Diagnosis the following statement bearing upon this point may be found:

"When some râles are present at the apex of either lung the diagnosis of tuberculosis is almost certain. but if, as not infrequently occurs, there are no râles to be heard over the suspected area, our diagnosis is clear *only* in case the sign occurs at the left apex. Precisely the same signs if present at the right apex leaves one in doubt regarding the diagnosis, for the reason that, as has been explained above, we find at the apex of the right lung, in health, signs almost exactly identical with those of a slight degree of consolidation. Hence if these signs, and only these signs, are discovered at the right apex, we cannot feel sure about the diagnosis until it is confirmed by the appearance of râles in the same area of the left



side, whether under the influence of iodide of potassium or spontaneously, or by the finding of tubercle bacilli in the sputum."

After reading this quotation, the deduction seems warrantable that an opinion or conclusion may be delayed until some softening has occurred or the signs of a possible destructive process are divulged. On the contrary, the signs of old or recent consolidation are often perfectly apparent in the right apex when no râles are present. When in doubt, comparison should be made with adjoining portions of the same lung, and the mobility of the apex and the character of the whispering voice sounds especially should be noticed. Again, the extension of consolidation in the right apex with the characteristic sounds which denote it can be followed, and repeated examinations are apt to reveal a decided change in the size of the area involved. The difficulty in recognizing bronchovesicular breathing is not so great as that encountered when the breathing is partially suppressed, and the percussion note and the whispering sound become quite valuable.

Cogwheel respiration and the transmission of heart-sounds are often purely nervous in origin. Cogwheel breathing may have little diagnostic value or significance except to arouse suspicion and lead to further examination. If the heart-sounds are transmitted more clearly to the right apex than to the left, it is entitled to some consideration. As a rule, however, the transmitted heart-sounds are only noticeable after considerable consolidation, and they may be present one day and absent the next, depending upon the nervous excitement sometimes caused by undergoing examination.

One of the most reliable signs of slight consolidation is surprisingly neglected. I refer to the transmitted whisper produced by the patient whispering



the word ninety-nine. The variation in pitch and the prolongation of sound are far more easily detected than when the speaking voice is employed. I regard this sign as one of the greatest value, especially when attempting to define the limit of an affected area. Finally, it must be remembered that the duration of the expiratory sound cannot be properly measured if the patient is not allowed to breathe naturally and preserve the rhythm. By forcing the patient to breathe rapidly, as is frequently done during examination, the full length of expiratory effort is curtailed. The older English and American writers employed a term most concise and descriptive. The moist sounds were alluded to as "clicks" and "râles." The word click should be preserved as descriptive of the tones heard at an early period and indicative of an abnormal amount of mucus or mucopus which coats the mucous membrane. These fine moist bronchial râles can usually be heard at an early period during infiltration and deposit by obliging the patient to cough, otherwise they will escape observation. Without cough the mucus may not be dislodged or the agglutinated surfaces separated. Their localization, when absent elsewhere, is an important aid in diagnosis. They are fugitive and scarce, and râles of the character which should be designated as crackling or moist râles appear later in large numbers, due to fluid in the bronchioles and the smaller bronchial tubes when softening has occurred.

Perhaps localized sibilant breathing has been assigned too much importance as a sign of tuberculosis, particularly in a person suffering from a cold, lithemia, influenza, or grippe. On the other hand, a localized bronchitis should be watched, and may lead to the detection of other signs and symptoms as they appear.

One word in reference to the term "dry râle." It

seems to be gaining general acceptance. Thus far the most labored explanation fails to excuse its adoption. One refers to its causation as pleuritic and uses it as synonymous with the pleural crepitation or fine friction sounds. Another attempts to discriminate between dry bronchial râles and moist bronchial râles. I confess to a feeling of confusion and a strong antipathy to the term. It seems to have no pathological basis, and it is hard to conceive of a dry rattling in the bronchi.

In closing, permit me to explain that I present this paper largely because the time seems ripe for a discussion of surprising conditions only too prevalent. A widespread growing movement has been inaugurated to provide proper care for the consumptive. At present this subject is being agitated in most of the States in this country, and many of them will build institutions in the immediate future. To attain lasting results the case should be reached early. There will certainly be a reaction when the tendency to relapse is fully appreciated and statistics of so-called arrested cases have been carefully scrutinized. The prediction that great difficulty would be encountered in securing cases for treatment at the proper time has been verified, and the opinion that the medical profession requires education as well as the public has not been relinquished. Evidently renewed attention must be directed to the vital importance of a more thorough and accurate study of the physical signs.



